33.07

**BBXRT Observations of BL Lac Object PKS 2155-304**

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We report the observations of PKS 2155-304 with the Broad Band X-ray Telescope. This object is one of the brightest BL Lac objects in the X-ray sky, often reaching a 1 keV flux density of 10 mJy or more. Previous observations with the Einstein Observatory Objective Grating Spectrometer by Canizares and Kuper (1984) revealed a sharp absorption feature at ~650 eV, reminiscent of broad optical absorption lines seen in some quasars. The BBXRT observations, in an exposure of less than 2000 seconds, clearly detect this absorption feature centered at roughly the same energy as the Einstein OGS data, suggesting that it is long-lived or persistent.

The best candidate for the absorption line is Ly-α oxygen VIII resonance absorption trough (E_{res} = 654 eV), blueshifted from the object (Canizares and Kuper 1984). To get the optical depth in the line as high as observed, and be consistent with the blueshift relative to the object, one needs high mass outflow from the nucleus (e.g., a hot wind). The high mass loss rate can be avoided if the flow is collimated towards the observer (Krolik et al. 1985).

In this presentation, we report the spectral fits to the BBXRT data for the overall continuum as well as the shape of the feature. We also discuss the spectral variability of the object, and present the limits on the strength of the expected associated iron line to confirm the validity of the O VIII interpretation. Furthermore, we present evidence that such features are probably common in BL Lac objects.

33.08

**Observations of [Fe II] λλ007A and H-beta in the z=2.1 quasar Q1314+170**


The new cooled-grating infrared-array spectrometer, G4S, has been used on UKIRT to obtain spectra in the 1.5- to 4.5-μm region of Q1314+170. The [Fe II] and H-beta lines are observed to have redshifts similar to those of low-ionization lines such as Mg II; these redshifts are significantly higher than the high-ionization redshift. Thus the low-ionization lines give a reliable estimate for the true redshift in this object (z=2.094), and the high-ionization material is likely to be flowing out of the quasar and to be suffering some continuum obscuration.

33.09

**The Buried Quasar in Cygnus A**


We present near-infrared spectroscopic observations (made with UKIRT) of the central region of the luminous radio galaxy Cygnus A (3C 405), and discuss the results in terms of an obscured quasar nucleus. We have detected strong emission in the molecular hydrogen lines v=1-0 S(1) and v=1-0 S(3), the strengths of which are plausibly accounted for through heating by the nuclear hard X-ray source. The large equivalent widths of these molecular hydrogen lines and the near infrared narrow hydrogen recombination lines suggest that the observed nuclear continuum is strongly attenuated at K band.

Assuming Cygnus A obeys the good correlations between hard X-ray, broad hydrogen line and near-infrared continuum luminosities established for quasars with little reddening, the intrinsic strengths of broad Paschen α and the 2.2 μm continuum in Cygnus A may be estimated empirically. Our observed limit to the flux of broad Paschen α then implies an extinction to the putative broad line region A_v (BL) of at least 24 mag, and the observed continuum intensity of the nuclear point source at 2.2 μm (Djorgovski et al. 1991) gives an extinction A_v (NC) =54±9 mag towards the optical-infrared continuum. These estimates are consistent with the gas column density inferred from the low energy X-ray cut-off. The obscuring material probably takes the form of a molecular torus around the nucleus. We also report strong [SIV] 1.962 μm line emission from Cygnus A, the first such detection in a radio galaxy.

**Session 34: Orion Nebula, Molecular Clouds**

**Oral Session, 10:00–11:30 am**

**Fifth Avenue**

34.01

**Faint Lines of [Fe II], [Fe III], [Ni II] and [Ni III] in the Spectrum of NGC 1976, and Its Abundances of Fe and Ni**

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Ten emission lines of [Fe II], twelve of [Fe III], two of [Ni II] and one of [Ni III] were measured on long-exposure CCD spectra of a region just north of the Trapezium in NGC 1976, the Orion nebula. They cover the wavelength range 13180–11000. All of these lines are quite weak, and most of them had been at least tentatively identified by earlier authors. Other expected lines of these ions which were not measured can be explained as blended with stronger nebular lines, or affected significantly by imperfect sky subtraction. These measurements were used to calculate abundance (in the gas phase) of Fe", Fe", Ni", and Ni". Published collision strengths are available for [Fe III] and [Ni III], newly calculated ones for [Fe II] by Pradhan, and estimated values were used for [Ni III]. Our results apparently confirm Henry’s tentative conclusion that there is some error in the available [Ni II] atomic data, or an additional unrecognized excitation process for its lines. However, the resulting abundances show clearly that Fe and Ni are depleted by approximately a factor of ten in the gas phase, no doubt indicating that these elements are still mostly locked up in solid particles even near the center of NGC 1976.

34.02

**Molecular Outflows Associated with Young Stellar Objects in the L1641 Region of Orion**

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We present the results of a follow up survey of a flux limited sample of IRAS sources located in the L1641 region south of the Orion Nebula. The initial survey identified several molecular outflow candidates based on the J = 1 → 0 transition of 12CO, 13CO, C 18O and the J = 2 → 1 transition of CS (Morgan and Bally 1991). The molecular outflow sources identified include all previously known molecular outflows and, reported for the first time, three additional molecular outflows. None of the observed molecular outflows appear to be oriented along a preferred direction and they are also distributed nonuniformly throughout the L1641 region. Maps of the molecular outflows suggest that the direction of the molecular outflow may be shaped by the ambient molecular cloud. The estimated momentum of the observed molecular outflows is found to be sufficient to support the molecular cloud over the dissipation time scale against gravitational collapse.